REMARKS

As a preliminary matter, Applicant would like to sincerely thank the Examiner for the in-person interview on July 27, 2005.

Now then, **Claims 1-43** were pending. With the Response, Applicant cancelled Claims 39-42 and added new Claims 44-63 for the Examiner's additional consideration, by which **Claims 1-38** and **43-63** are now pending.

Applicant has **not** added any new matter with any of these claim amendments, for which supports abounds throughout the original specification, figures, and claims, as understood by those skilled in the art. By way of representative and non-limiting example, the Examiner can find exemplary support as follows:

- **Claim 44**: unitary construction is manifest from at least FIGS. 2-3, 9, and 14 of the original, non-provisional patent application, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art;
- **Claim 45**: $\alpha \neq 180°$ is manifest from at least extending Applicant's tank core passage into a plane containing the longitudinal axis, the plane oriented in non-perpendicular relation to a surface of the valve housing comprising at least a P, T, A, and B port and standard mounting holes for mounting the valve base module to at least one of a sub-plate or bar manifold, with a perpendicular relation otherwise containing 180° as an inherent component thereof, and a non-perpendicular relation therefore exclusive thereof, as Applicant described throughout the original specification, figures, and claims, as understood by those skilled in the art;
- **Claim 46**: standard mounting patterns are manifest from at least page 10, lines 1-12; page 13, line 22 through page 14, line 3; and page 29, lines 8-10, all of the original, non-provisional patent application, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art;
- **Claims 47-49**: DO3, DO5, and DO8 valve patterns are manifest from at least page 4, lines 9-10 of the original, non-provisional patent application, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art;
- **Claims 50-51**: industrial and mobile market applicabilities are manifest from at least page 1, line 10 of the original, non-provisional patent application, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art;
- **Claims 52-53**: both the i) tank core passage directly connecting the chambers, and ii) valve base module containing a single tank core passage are manifest from at least FIGS. 3-A, 3-B, 14-A, and 14-B of the original, non-provisional patent application, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art;

- **Claim 54**: the valve element being not directly actuable by one or more electromagnetic devices is manifest from at least FIGS. 2-6 and 8-14 of the original, non-provisional patent application, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art; and
- **Claims 55-59**: each of the recited claim elements and relations are manifest from at least the original Claim 1 and FIGS. 2-3, 9, and 14, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art.

Now then, in the interest of clarity, the following Items Numbers correspond to the Examiner's Item Numbers in the July 6, 2005 Office Action.

1. The Examiner objected to FIGS. 1-4, 8-10, 12-14, and 17 as containing multiple views. The Examiner suggested that Applicant give each view a separate figure number and modify the text of the specification accordingly, which Applicant did. More specifically, Applicant included Replacement Drawing Sheets in **Attachment A**, which now label each individual view in each figure with a corresponding figure number, and modified the corresponding text of the specification, including the Brief Description of the Several Views of the Drawings, as requested. Although the Examiner did not require amendments to FIGS. 5-7, 11, and 15-16, Applicant also provided Replacement Drawing Sheets for these drawings in **Attachment A**, particularly since the total number of drawings has now changed, requiring a change from, e.g., drawing sheet ~~1/15~~ to 1/16 and so fourth. In addition, Applicant also clarified that the modular apparatus shown is labeled as ~~50~~ 50' in FIG. 9. Applicant has **not** added any new matter with this amendment to the drawings or to the specification, for which supports abounds throughout the original specification, figures, and claims, as understood by those skilled in the art.

In addition, Applicant included new FIGS. 18-20 in the New Drawing Sheets in **Attachment B** and modified the corresponding text of the specification accordingly. As Applicant discussed with the Examiner during the in-person interview, Applicant has **not** added any new matter with this amendment to the drawings or to the specification, for which supports abounds throughout the original specification, figures, and claims, as understood by those skilled in the art, as well as from the well-known industry standards. For example, FIGS. 1-C, 2-C, 3-C, 4-C, 9-C, 10-C, 13-C, and 14-C depict a standard DO3 valve pattern, while FIG. 18 depicts a standard DO5 valve pattern and FIG. 19 depicts a standard DO8 valve pattern. Applicant identified each of these DO3, DO5, and DO8 valve patterns at page 4, lines 9-10 of the original, non-provisional patent application, and they represent well-known industry standards for the

various standard mounting patterns, as Applicant hereby demonstrates with **Attachment C** and discussed with the Examiner during the in-person interview. Since these standard valve patterns are well-known industry standards and Applicant explicitly mentioned them by name in the original specification, their inclusion in FIGS. 18-19 is **not** new matter.

In addition, each of the following patterns are well-known functional equivalents of one another, with the only differences being the overall sizes of the valves and the orifices extending therethrough: i) DO2 and DO3 valve patterns; ii) DO5, DO5H, DO5HE, and DO6 valve patterns, and iii) DO7, DO8, and D10 valve patterns. For example:

- the P, T, A, and B ports of both the DO2 and DO3 valve patterns approximate a diamond;
- the P, multiple T, A, and B ports of the DO5, DO5H, DO5HE, and DO6 valve patterns approximate a chevron; and
- the P, T, A, and B ports of the DO7, DO8, and D10 valve patterns approximate a parallelogram;

as Applicant hereby demonstrates with **Attachment C** and discussed with the Examiner during the in-person interview. Moreover, various standard-setting bodies—which are manifest from at least page 10, lines 1-12; page 13, line 22 through page 14, line 3; and page 29, lines 8-10, all of the original, non-provisional patent application, as well as throughout the original specification, figures, and claims, as understood by those skilled in the art—refer to these valve patterns by different names, as Applicant summarized in FIG. 20 for the Examiner's convenience, which depicts a chart of relationships between the various standard mounting patterns from the various standard-setting bodies, as Applicant again provides in **Attachment C** and discussed with the Examiner during the in-person interview.

2. The Examiner requested Applicant's cooperation in correcting any errors of which Applicant became aware in the specification. Accordingly, Applicant harmonized various minor, typographical errors of which Applicant became aware, as requested. Applicant has **not** added any new matter with these amendments to the specification, for which supports abounds throughout the original specification, figures, and claims, as understood by those skilled in the art.

3-8. The Examiner made the following rejections:

- Claims 1-19, 21-22, 28-30, and 39-43 under 35 USC § 102(b) as being anticipated by U.S. Pat. No. 4,359,064 to Kimble ("Kimble");

- Claims 20, 23-27, and 31-34 under 35 USC § 103(a) as being unpatentable over Kimble;
- Claims 35-36 under 35 USC § 103(a) as being unpatentable over Kimble in view of U.S. Pat. No. 4,907,615 to Meyer et al. ("Meyer"); and
- Claims 37-38 under 35 USC § 103(a) as being unpatentable over Kimble in view of U.S. Pat. No. 4,011,891 to Knutson et al. ("Knutson").

Respectfully, Applicant traverses and requests withdrawal.

During the in-person interview, the Examiner and Applicant discussed the following: i) the various cited references, including Kimble; and ii) a proposed claim, which the Examiner indicated would avoid Kimble (i.e., be allowable) if Applicant added the wording "for mounting said valve base module to a manifold or subplate," as the Examiner noted in the Interview Summary. As a result of these discussions, the Examiner and Applicant reached agreement with respect to the claims, as the Examiner again noted in the Interview Summary. Accordingly, Applicant incorporated the discussed change into Applicant's original independent Claims 1, 16, 23, 27-28, 31, 34-35, 37, and 43 (as well as Applicant's new independent Claims 55-59), as shown above, for the Examiner's approval, which Applicant earnestly believes fully comply with the Examiner's comments during the in-person interview and which overcome each of the Examiner's rejections—including Kimble and Kimble's failure to teach or render obvious Applicant's tank core passage connecting at least some of Applicant's chambers, the tank core passage extending within a plane containing a longitudinal axis, the plane oriented in non-perpendicular relation to a surface of a valve housing comprising at least a P, T, A, and B port and standard mounting holes for mounting the valve base module to at least one of a sub-plate or bar manifold, which permit an extended pressure port P' and two extended working ports A', B' to extend to a surface of the valve housing and permit other modules to be mounted thereto, all of which Applicant does, and which Kimble does not. Accordingly, Applicant respectfully asserts that each of the above rejections is rendered moot in view of their individual and collective failures to teach or suggest all of Applicant's claimed arrangements.

As a result of at least the foregoing, Applicant respectfully asks the Examiner to withdraw the rejection of Claims 1-19, 21-22, 28-30, and 39-43 under 35 USC § 102(b) as being anticipated by Kimble; Claims 20, 23-27, and 31-34 under 35 USC § 103(a) as being unpatentable over Kimble; Claims 35-36 under 35 USC § 103(a) as being unpatentable over

Kimble in view of Meyer; and Claims 37-38 under 35 USC § 103(a) as being unpatentable over Kimble in view of Knutson.

CONCLUSION

Applicant believes Applicant has overcome the Examiner's objection to the drawings and each of the following rejections: Claims 1-19, 21-22, 28-30, and 39-43 under 35 USC § 102(b) as being anticipated by Kimble; Claims 20, 23-27, and 31-34 under 35 USC § 103(a) as being unpatentable over Kimble; Claims 35-36 under 35 USC § 103(a) as being unpatentable over Kimble in view of Meyer; and Claims 37-38 under 35 USC § 103(a) as being unpatentable over Kimble in view of Knutson. Accordingly, Applicant believes Claims **1-38** and **43-63** are patentable and respectfully submits that all pending claims are in a condition for allowance, which Applicant respectfully requests.

Applicant also believes this Response should allow the Examiner to allow the above-referenced patent application to issue as a U.S. patent without further amendments to the specification or claims. Thus, Applicant also requests notification to that effect.

If questions arise, please telephone Applicant's undersigned attorney.

ATTACHMENT A: REPLACEMENT DRAWING SHEETS (FIGS. 1-17)

ATTACHMENT B: NEW DRAWING SHEET (FIGS. 18-20)

ATTACHMENT C: INDUSTRY SUPPORT SHEETS

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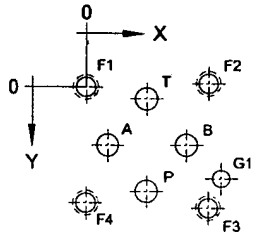
Directional Valve Patterns

These drawings are for reference only. Please consult the appropriate standard when dimensions are critical. Some holes are added per industry convention. Dimensions may vary on our products. It should not be assumed that each hole shown is found on a given product.

D02 ISO 4401-02-01-0-94
NFPA T3.5.1 R2-2002 D02



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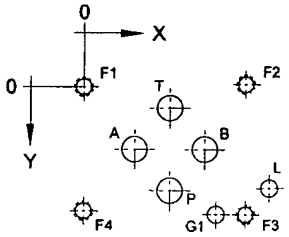

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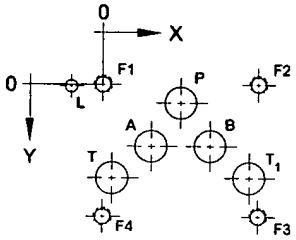

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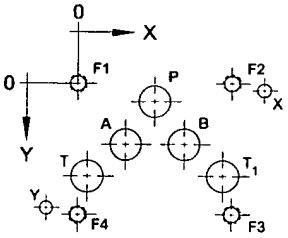
D05 - Alternative B



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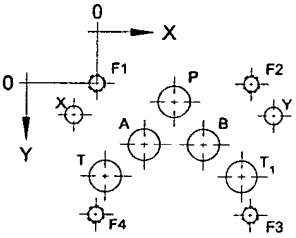
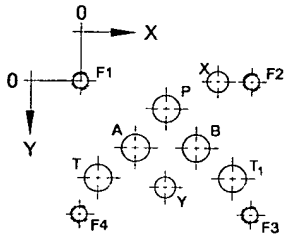
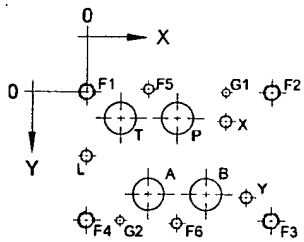
NFPA T3.5.1 R2-2002 D05 - Alternative A



D06 NFPA T3.5.1 R2-2002 D06



D07 ISO 4401-07-06-0-94
NFPA T3.5.1 R2-2002 D07



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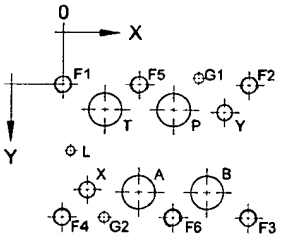

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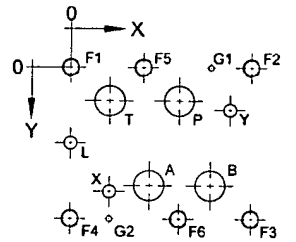

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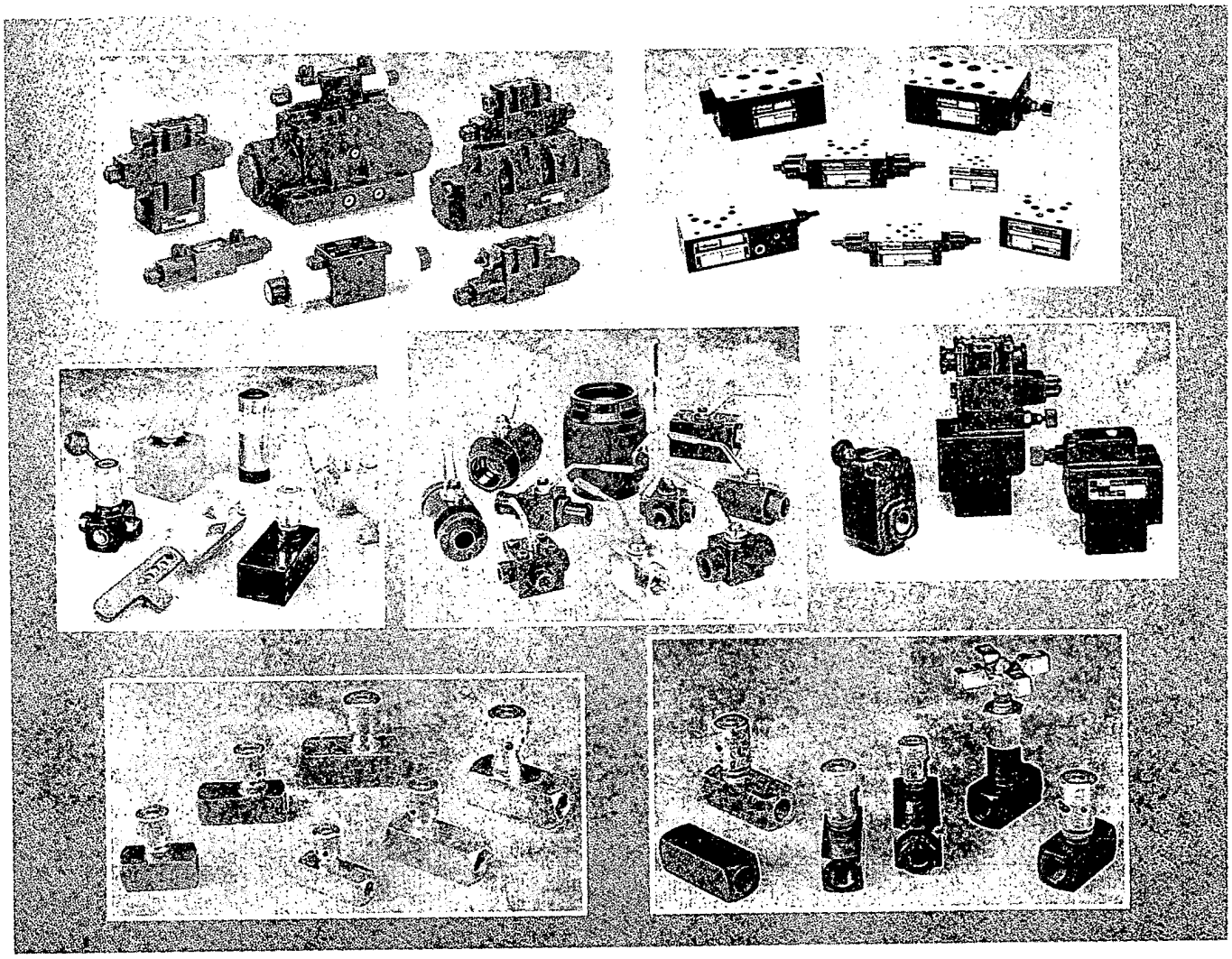
Pattern	Axis	P	A	T	T_1	B	X	Y	L	F1	F2	F3	F4	F5	F6	G1	G2
D02	X	0.472 [12.0]	0.169 [4.3]	0.472 [12.0]	--	0.776 [19.7]	--	--	--	0 [0]	0.945 [24.0]	0.945 [24.0]	0 [0]	--	--	1.043 [26.5]	--
	Y	0.797 [20.25]	0.443 [11.25]	0.089 [2.25]	--	0.443 [11.25]	--	--	--	0 [0]	-0.030 [-0.75]	0.915 [23.25]	0.886 [22.5]	--	--	0.699 [17.75]	--
	ϕ (max)	0.177 [4.5]	0.177 [4.5]	0.177 [4.5]	--	0.177 [4.5]	--	--	--	#10-24 M5	#10-24 M5	#10-24 M5	#10-24 M5	--	--	0.134 [3.4]	--
D03	X	0.847 [21.5]	0.500 [12.7]	0.847 [21.5]	--	1.189 [30.2]	--	--	1.831 [46.5]	0 [0]	1.595 [40.5]	1.595 [40.5]	0 [0]	--	--	1.299 [33.0]	--
	Y	1.020 [25.9]	0.610 [15.5]	0.201 [5.1]	--	0.610 [15.5]	--	--	0.988 [25.1]	0 [0]	-0.030 [-0.75]	1.250 [31.75]	1.221 [31.0]	--	--	1.250 [31.75]	--
	ϕ (max)	0.295 [7.5]	0.295 [7.5]	0.295 [7.5]	--	0.295 [7.5]	--	--	0.158 [4.0]	#10-24 M5	#10-24 M5	#10-24 M5	#10-24 M5	--	--	0.158 [4.0]	--
D05	X	1.063 [27.0]	0.658 [16.7]	0.126 [3.2]	2.000 [50.8]	1.469 [37.3]	--	--	-0.433 [-11.0]	0 [0]	2.126 [54.0]	2.126 [54.0]	0 [0]	--	--	--	--
	Y	0.248 [6.3]	0.843 [21.4]	1.280 [32.5]	1.280 [32.5]	0.843 [21.4]	--	--	0.020 [0.5]	0 [0]	0 [0]	1.811 [46.0]	1.811 [46.0]	--	--	--	--
	ϕ (max)	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	--	--	0.177 [4.5]	.25-20 M6	.25-20 M6	.25-20 M6	.25-20 M6	--	--	--	--
D05H	X	1.063 [27.0]	0.658 [16.7]	0.126 [3.2]	2.000 [50.8]	1.469 [37.3]	2.563 [65.1]	-0.441 [-11.2]	--	0 [0]	2.126 [54.0]	2.126 [54.0]	0 [0]	--	--	--	--
	Y	0.248 [6.3]	0.843 [21.4]	1.280 [32.5]	1.280 [32.5]	0.843 [21.4]	0.095 [2.4]	1.721 [43.7]	--	0 [0]	0 [0]	1.811 [46.0]	1.811 [46.0]	--	--	--	--
	ϕ (max)	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.189 [4.8]	0.189 [4.8]	--	.25-20 M6	.25-20 M6	.25-20 M6	.25-20 M6	--	--	--	--
D05HE	X	1.063 [27.0]	0.658 [16.7]	0.126 [3.2]	2.000 [50.8]	1.469 [37.3]	-0.315 [-8.0]	2.441 [62.0]	--	0 [0]	2.126 [54.0]	2.126 [54.0]	0 [0]	--	--	--	--
	Y	0.248 [6.3]	0.843 [21.4]	1.280 [32.5]	1.280 [32.5]	0.843 [21.4]	0.433 [11.0]	0.433 [11.0]	--	0 [0]	0 [0]	1.811 [46.0]	1.811 [46.0]	--	--	--	--
	ϕ (max)	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	0.248 [6.3]	0.248 [6.3]	--	.25-20 M6	.25-20 M6	.25-20 M6	.25-20 M6	--	--	--	--
D06	X	1.750 [44.45]	1.120 [28.45]	0.380 [9.65]	3.120 [79.25]	2.380 [60.45]	2.811 [71.4]	1.750 [44.45]	--	0 [0]	3.500 [88.9]	3.500 [88.9]	0 [0]	--	--	--	--
	Y	0.561 [14.25]	1.380 [35.05]	2.000 [50.8]	2.000 [50.8]	1.380 [35.05]	0 [0]	2.180 [55.37]	--	0 [0]	0 [0]	2.750 [69.85]	2.750 [69.85]	--	--	--	--
	ϕ (max)	0.579 [14.7]	0.579 [14.7]	0.579 [14.7]	0.579 [14.7]	0.579 [14.7]	0.441 [11.2]	0.441 [11.2]	--	.38-16 M10	.38-16 M10	.38-16 M10	.38-16 M10	--	--	--	--
D07	X	1.969 [50.0]	1.343 [34.1]	0.721 [18.3]	--	2.595 [65.9]	3.016 [76.6]	3.469 [88.1]	0 [0]	0 [0]	4.000 [101.6]	4.000 [101.6]	0 [0]	1.343 [34.1]	1.969 [50.0]	3.016 [76.6]	0.721 [18.3]
	Y	0.563 [14.3]	2.189 [55.6]	0.563 [14.3]	--	2.189 [55.6]	0.626 [15.9]	2.252 [57.2]	1.374 [34.9]	0 [0]	0 [0]	2.752 [69.9]	2.752 [69.9]	-0.063 [-1.6]	2.815 [71.5]	0 [0]	2.752 [69.9]
	ϕ (max)	0.689 [17.5]	0.689 [17.5]	0.689 [17.5]	--	0.689 [17.5]	0.248 [6.3]	0.248 [6.3]	0.248 [6.3]	.38-16 M10	.38-16 M10	.38-16 M10	.38-16 M10	.25-20 M6	.25-20 M6	0.158 [4.0]	0.158 [4.0]
D08	X	3.032 [77.0]	2.095 [53.2]	1.158 [29.4]	--	3.969 [100.8]	0.689 [17.5]	4.437 [112.7]	0.221 [5.6]	0 [0]	5.126 [130.2]	5.126 [130.2]	0 [0]	2.095 [53.2]	3.032 [77.0]	3.721 [94.5]	1.158 [29.4]
	Y	0.689 [17.5]	2.937 [74.6]	0.689 [17.5]	--	2.937 [74.6]	2.874 [73.0]	0.748 [19.0]	1.811 [46.0]	0 [0]	0 [0]	3.626 [92.1]	3.626 [92.1]	0 [0]	3.626 [92.1]	-0.189 [-4.8]	3.626 [92.1]
	ϕ (max)	0.984 [25.0]	0.984 [25.0]	0.984 [25.0]	--	0.984 [25.0]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	.50-13 M12	.50-13 M12	.50-13 M12	.50-13 M12	.50-13 M12	.50-13 M12	0.295 [7.5]	0.295 [7.5]
D10	X	4.500 [114.3]	3.248 [82.5]	1.626 [41.3]	--	5.811 [147.6]	1.626 [41.3]	6.626 [168.3]	0 [0]	0 [0]	7.500 [190.5]	7.500 [190.5]	0 [0]	3.000 [76.2]	4.500 [114.3]	5.457 [138.6]	1.626 [41.3]
	Y	1.378 [35.0]	4.874 [123.8]	1.378 [35.0]	--	4.874 [123.8]	5.126 [130.2]	1.752 [44.5]	3.126 [79.4]	0 [0]	0 [0]	6.252 [158.8]	6.252 [158.8]	0 [0]	6.252 [158.8]	0 [0]	6.252 [158.8]
	ϕ (max)	1.260 [32.0]	1.260 [32.0]	1.260 [32.0]	--	1.260 [32.0]	0.441 [11.2]	0.441 [11.2]	0.441 [11.2]	.75-10 M20	.75-10 M20	.75-10 M20	.75-10 M20	.75-10 M20	.75-10 M20	0.295 [7.5]	0.295 [7.5]

Industrial Hydraulic Valves

Catalog HY14-2502/US



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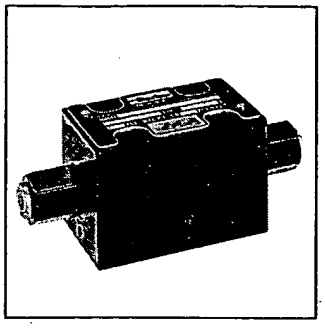
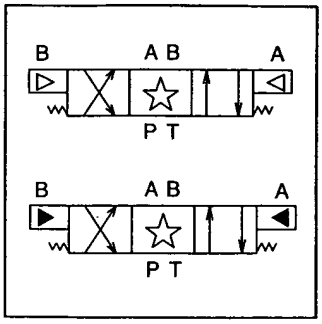
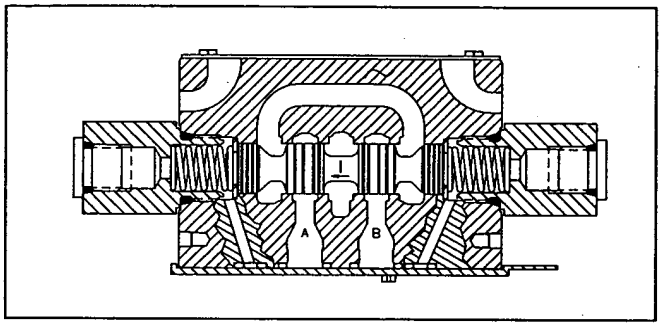
General Description

The D1VA and D1VP Series directional control valves are high-performance, 4 and 5-chamber, direct operated, air and oil pilot controlled, 3 or 4-way valves. They are available in 2 or 3-position and conform to NFPA's D03/CETOP 3 mounting patterns.







Features

- Low pilot pressure required – 3.4 Bar (50 PSI) minimum
- Manual overrides standard

Air Operated

Shift Volume. The air pilot chamber requires a volume of 1.8 cc (.106 in.^{3}) for complete shift from center to end.

Pilot Piston. The pilot piston area is 506 mm^2 (.785 in.^{2}). Pilot piston stroke is 3.4 mm (.135 in.).

Response Time. Response time will vary with pilot line size, pilot line length, pilot pressure, air control valve shift time and air valve flow capacity (Cv).

Oil Operated

Shift Volume. The hydraulic pilot chamber requires a volume of 0.7 cc (.042 in.^{3}) for complete shift from center to end.

Pilot Piston. The hydraulic piston area is 198 mm^2 (.307 in.^{2}). Pilot piston stroke is 3.4 mm (.135 in.).

Response Time. Response time will vary with pilot line size, pilot line length, pilot pressure, pilot valve shift time and air valve flow capacity (GPM).

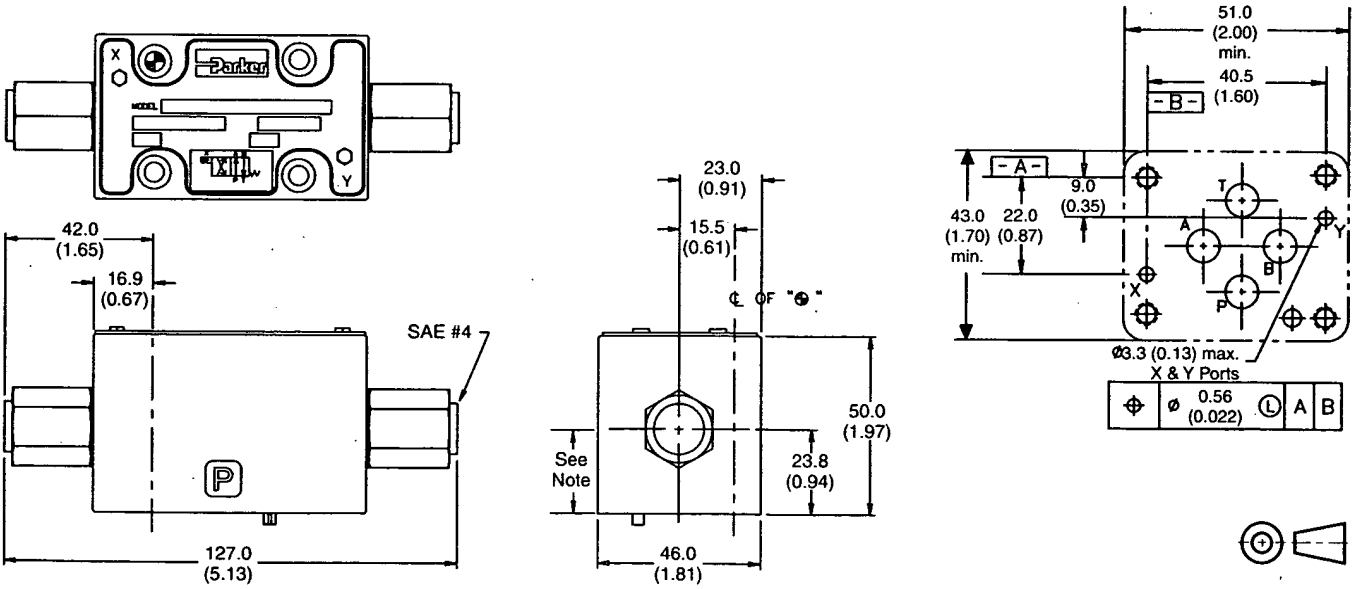
Specifications

Mounting Pattern	NFPA D03, CETOP 3, NG 6	
Maximum Pressure	Operating:	345 Bar (5000 PSI)
	Tank Line: D1VA	34 Bar (500 PSI)
	D1VP	207 Bar (3000 PSI)
Maximum Flow	See Quick Reference Chart	
Pilot Pressure	D1VA:	
	Air Minimum	3.4 Bar (50 PSI)
	Air Maximum	10.2 Bar (150 PSI)
	D1VP:	
	Oil Minimum	15.2 Bar (220 PSI)
	Oil Maximum	207 Bar (3000 PSI)

Dimensions

Inch equivalents for millimeter dimensions are shown in (**)

Oil Operated D1VP, Single and Double Pilot



Note: 22.0 mm (0.87") from bottom of bolt counterbore.

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Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 150-250 SSU (32 -54 cst) at 38°C (100°F) is recommended. The absolute operation viscosity range is from 80-1000 SSU (16-220 cst). Oil should have maximum anti-wear properties and rust and oxidation treatments.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate ester or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions, and petroleum oil may be used with NITRILE seals.

Temperature Recommendation

Recommended oil temperature:
-7° to +71°C (-20 to +160°F)

Filtration

For maximum valve and system component life, the system should be protected at a contamination level not to exceed 125 particles greater than 10 microns per milliliter of fluid. (SAE Class 4 or better, ISO Code 16/13).

Tank Line Surges

If several valves are piped with a common tank line, flow surges in the line may cause unexpected spool shift. Detent style valves are most susceptible to this. Separate tank lines should be used when line surges are expected in an application.

Recommended Mounting Position

Valve Type	Recommended Mounting Position
Detent (Solenoid)	Horizontal
Spring Centered	Unrestricted
Spring Offset	Unrestricted

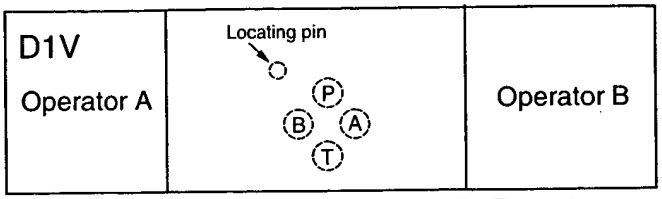
Silting

Silting can cause any sliding spool valve to stick and not spring return, if held shifted under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Single Pass Operation

Valve flow ratings are for double pass operation (with equal flow in both paths). When using these components in single pass applications, flow capabilities may be reduced. Consult your local Parker representative for details.

Flow Path Data



*Note: On valves with 008 or 009 spool, A and/or B operators reverse sides. Flow paths remain the same as viewed from top of valve.

Double Solenoid. With solenoid "A" energized, flow path is P→A and B→T. When solenoid "B" is energized, flow path is P→B and A→T. The center condition on a spring-centered valve exists when both coils are de-energized, or during a complete shift, as the spool passes through center.

Detent and Spring Offset. The center condition exists on detent and spring offset valves only during spool crossover. To shift and hold a detented spool, only a momentary energizing of the solenoid is necessary. The minimum duration of the signal is approximately 0.1 seconds for DC voltages. This position will be held provided the spool center line is in a horizontal plane, and no shock or vibration is present to displace the spool.

Single Solenoid. Spring offset valves can be ordered in styles B, E, F, H, K and M. Flow path data for the various styles are described in the order chart.

Electrical Failure

Should electric power fail, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop simultaneously, machine actuators may continue to function in an undesirable manner or sequence.

Torque Specifications

Torque values recommended for the bolts which mount the valve to the manifold or subplate are as follows:

#10-24 thread (M5-0.8) torque 5.6 Nm (50 in-lbs).

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Fluid Recommendations

Premium quality hydraulic oil with a viscosity range between 150-250 SSU (32 -54 cst) at 38° C (100°F) is recommended. The absolute operation viscosity range is from 80-1000 SSU (16-220 cst). Oil should have maximum anti-wear properties and rust and oxidation treatments.

Fluids and Seals

Valves using synthetic, fire-resistant fluids require special seals. When phosphate ester or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions, and petroleum oil may be used with NITRILE seals.

Temperature Recommendation

Recommended oil temperature:
-7° to +71°C (-20 to +160°F)

Filtration

For maximum valve and system component life, the system should be protected at a contamination level not to exceed 125 particles greater than 10 microns per milliliter of fluid. (SAE Class 4 or better, ISO Code 16/13).

Tank Line Surges

If several valves are piped with a common tank line, flow surges in the line may cause unexpected spool shift. Detent style valves are most susceptible to this. Separate tank lines should be used when line surges are expected in an application.

Recommended Mounting Position

Valve Type	Recommended Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

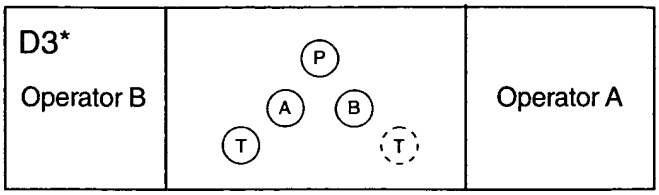
Silting

Silting can cause any sliding spool valve to stick and not spring return, if held shifted under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

Single Pass Operation

Valve flow ratings are for double pass operation (with equal flow in both paths). When using these components in single pass applications, flow capabilities may be reduced. Consult your local Parker representative for details.

Flow Path Data



*Note: On valves with 008 or 009 spool, A and/or B operators reverse sides. Flow paths remain the same as viewed from top of valve.

Double Solenoid. With solenoid "A" energized, flow path is P→A and B→T. When solenoid "B" is energized, flow path is P→B and A→T. The center condition on a spring-centered valve exists when both coils are de-energized, or during a complete shift, as the spool passes through center.

Detent and Spring Offset. The center condition exists on detent and spring offset valves only during spool crossover. To shift and hold a detented spool, only a momentary energizing of the solenoid is necessary. The minimum duration of the signal is aproximately 0.13 seconds for both AC and DC voltages. This position will be held provided the spool center line is in a horizontal plane, and no shock or vibration is present to displace the spool.

Single Solenoid. Spring offset valves can be ordered in six styles: B, E, F, H, K and M. Flow path data for the various styles are described in the order chart.

Lever Operated (on B end)

Pull lever away from valve	P→A; B→T
Push lever toward valve	P→B; A→T

Note: Reverse with a #8 or #9 spool.

Electrical Failure

Should electric power fail, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop simultaneously, machine actuators may continue to function in an undesirable manner or sequence.

Loss of Pilot Pressure (D3A)

Should a loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will remain in the last position held. If main hydraulic flow does not simultaneously stop, machine actuators may continue to function in an undesirable manner or sequence.

Torque Specifications

Torque values recommended for the bolts which mount the valve to the manifold or subplate are as follows:

1/4-20 thread (M6x1) torque 16.0 Nm (12 ft-lbs).

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Series D31VW, D31VA, D31VL, D3P

Subplate Mounting

NFPA D05H

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 16.3 Nm (12 ft-lbs).

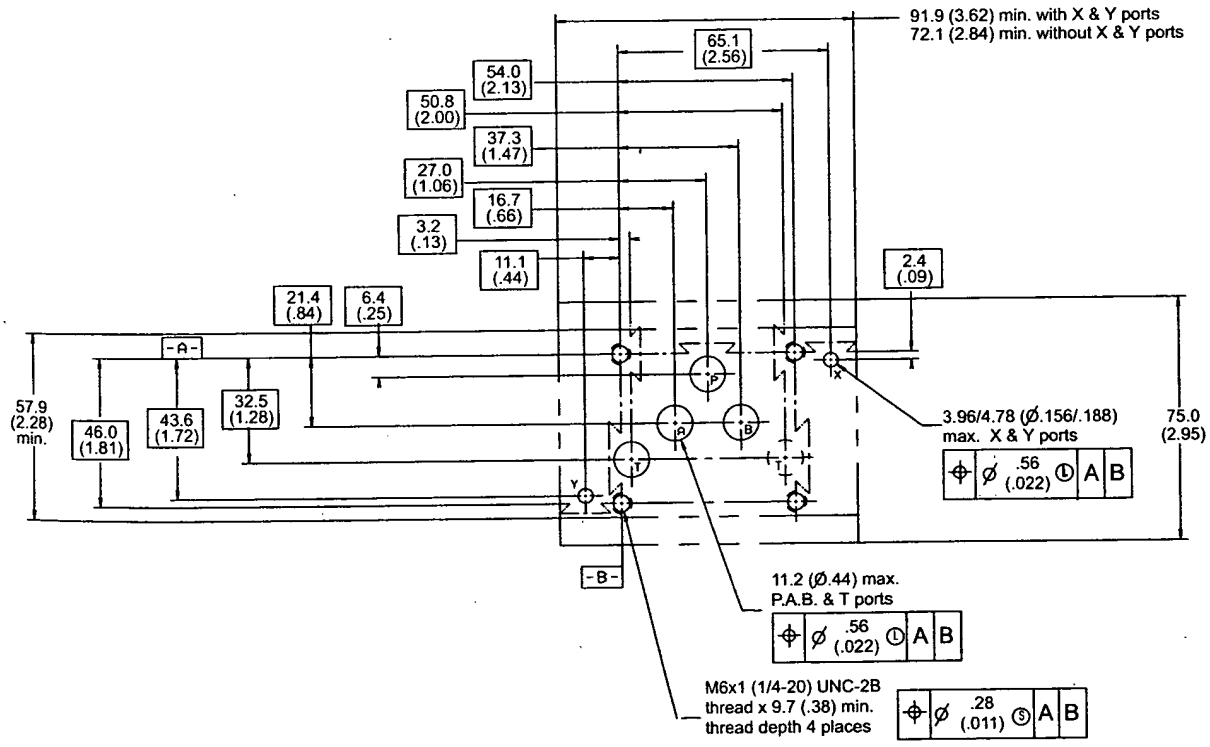
For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern

Inch equivalents for millimeter dimensions are shown in (**)



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Subplate Mounting

NFPA D08, CETOP 8 & NG 25

Recommended Mounting Surface

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 135.6 Nm (100 ft-lbs).

For maximum valve reliability, adhere to the following installation information.

Mounting Position

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

Mounting Pattern

Inch equivalents for millimeter dimensions are shown in (**)